

**A NEW SPECIES OF *COPELATUS* ERICHSON, 1832
(COLEOPTERA: DYTISCIDAE: COPELATINAE) FROM THE
ADELBERT RANGE OF PAPUA NEW GUINEA**

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Abstract

We describe *Copelatus adelbert* sp. n., the first member of the *Copelatus hydroporoides* group from the Australian Region. The species is endemic to the Adelbert Range in Papua New Guinea. In addition to lacking striae on elytra (character of the *C. hydroporoides* group), *Copelatus adelbert* sp. n. is very characteristic due to its colouration, with bright contrasting transversal, basal and apical orange bands on the otherwise dark elytron. Habitus and median lobe of the new species are illustrated and notes on the habitat are provided.

Introduction

The diving beetle genus *Copelatus* Erichson, 1832, is a diverse group of aquatic insects with more than 400 described species (Nilsson 2016) and a mainly pantropical distribution. For the identification of *Copelatus* species, it is often necessary to use, more or less, a combination of three character groups: (1) the shape of the median lobe of the aedeagus; (2) the pattern of surface sculpture and punctation, in particular the number of elytral striae, which has been used to establish species groups (see Sharp 1882, Guignot 1961, Guéorguiev 1968, catalogue: Nilsson 2016); and (3) the shape of the male protibia (Megna and Epler 2012). In some cases, identifications are augmented with the general habitus of the species and the body size. *Copelatus* has not yet been firmly justified as a monophyletic group based on morphological apomorphies. Recent molecular phylogenetic work suggests that this large genus might indeed be one radiation but, at the same time, it emerged that the number of elytral striae is highly variable within clades so that the species groups in current use are not monophyletic (Balke *et al.* 2004).

Species lacking elytral striae are currently assigned to the *Copelatus hydroporoides* group (see Hájek *et al.* 2010). No species of the *C. hydroporoides* group has been recorded previously from the Australian Region (hitherto known from the Afrotropical and Neotropical Regions as well as Wallacea (Hájek *et al.* 2010)). Here we describe its first species from the region, from Papua New Guinea.

Material and methods

This study is based on the examination of nine specimens, which are deposited in: NARI – PNG National Insect Collection, Port Moresby, Papua New Guinea; BMNH – Natural History Museum, London, UK; ZSMM – SNSB-Zoologische Staatssammlung, München, Germany.

All specimen data are quoted as they appear on the labels attached to the specimens. Label text is cited using quotation marks. Our red identification labels were attached to the types.

Photos and illustrations. The beetles were studied with a Leica MZ 12.5 stereo microscope at 10-100x. Drawings were digitally inked based on digital images using Corel Draw Graphics Suite X6. Images of the habitus was taken with a digital imaging system, composed of a Canon 5DS camera with Nikon bellows, a Thorlabs iris and 2x ELWD Plan Apo objective attached to a Mitutoyo focus lens. Image stacks were generated using a StackShot macro rail and images assembled with the computer software Helicon Focus 4.77TM.

Morphological observations. Six specimens were measured. In the descriptions and diagnoses, measurements are given as a minimum-maximum range followed by the mean. The following abbreviations are used for body measurements: EL – elytral length (along midline from anterior margin to apex); EW – elytral width (across greatest transverse width of both elytra combined); HL – head length (along midline from the anterior clypeal margin to the anterior pronotal margin); HW – head width (maximum width near posterior margin of the head); PL – pronotal length (along midline from anterior to posterior margin); PW – pronotal width at level of posterior margin; TL – total length (TL = HL+PL+EL). Finally, general body shape was quantified with the ratios PL/PW and TL/EW.

Copelatus adelbert sp. n.

(Figs 1-2)

LSID: urn:lsid:zoobank.org:pub:E91FB1D6-968C-4633-B805-9E0A9D8871C2.

Type locality. Keki birdwatching area in the Adelbert Mountains, Madang, Papua New Guinea, at 04°42'215"S, 145°25'154"E.

Type material. *Holotype* ♂, 'Papua New Guinea: Madang, Adelbert Mts., Sewan - Keki, 700 m, 04°42'215"S, 145°25'154"E, 4.v.2006, leg Balke & Manaono (PNG 51)' (in ZSM). *Paratypes*: 3 ♂♂, same data as holotype (ZSM; BMNH); 1 ♀, 'Papua New Guinea: Madang, Adelbert Mts., Keki, 850 m, 04°42'300"S, 145°25'089"E, 4.v.2006, leg Balke & Manaono (PNG 52)' (ZSM); 1 ♂, 'Papua New Guinea: Madang, Adelbert Mts., below Keki, 790 m, 04°42'300"S, 145°25'089"E, 5.v.2006, leg Balke & Manaono (PNG 53)'; 1 ♂, 2 ♀♀, 'Papua New Guinea: Madang, Adelbert Mts., creek nr Keki, 790 m, 04°42'300"S 145°25'08"9E, 28.xi.2006, Binatang Research Center team leg. (PNG 53a)' (ZSM; NARI).



Fig. 1. *Copelatus adelbert* sp. n.: photo of habitus in anterior-dorsolateral view to illustrate colouration of dorsal surface (Paratype, total length 6.3 mm).

Diagnosis. Medium sized, with smooth pronotum and elytra in both sexes; with conspicuous bright orange bands on roughly anterior and posterior thirds of elytron; median lobe of aedeagus of complex type, composed of several sclerites. Based on the lack of dorsal striae or striae, this species belongs to the *Copelatus hydroporoides* group, which has 51 species globally (Nilsson 2016). The only species known from the eastern Old World is the Oriental *C. sibelaemontis* Hájek *et al.*, 2010, from the Moluccas, which differs from the new species by the much darker colouration, shape of the male genitalia and, with a TL 4.6-5.0 mm, a smaller size than *C. adelbert* sp. n. (> 6.0 mm).

Description. Male. Habitus (Figs 1-2a). Body oval, slightly attenuated posteriorly, dorsoventrally depressed; broadest near mid length; lateral outline continuous in dorsal aspect.

Measurements and ratios (minimum-maximum, mean), in mm (n = 4): HL 0.4-0.5, 0.5; HW 1.7-1.8, 1.7; PL 0.7-0.8, 0.8; PW 2.8, 2.8; PW/PL 0.4, 0.4; EL 5.0-5.2, 5.1; EW 3.1-3.2, 3.1; TL/EW 2.0-2.1, 2.0; TL 6.3-6.4, 6.3.

Colour. Head orange. Pronotum very dark brown to blackish, anteriorly paler, laterally orange. Elytra very dark brown to blackish, with orange band covering about one quarter of the elytra at the base, and about one third of the elytra at the posterior end (Figs 1-2a). Venter very dark brown to blackish.

Sculpture and punctation. Entire dorsal side with fine, widely spaced punctures. Pronotum with transverse row of coarser punctures along base; posterior margin less densely punctate. Elytra with three longitudinal rows of widely spaced punctures generally extending to apex, one extending parallel to elytral starting at around base meeting the corner of scutellum. Metaventrite with transverse wrinkles on either side of median ridge.

Metacoxal plate with short striae, more or less longitudinal anteriorly but pointing slightly towards metacoxal process posteriorly. Abdominal ventrites with striae. Last ventrite with one short row of numerous long setae towards edges.

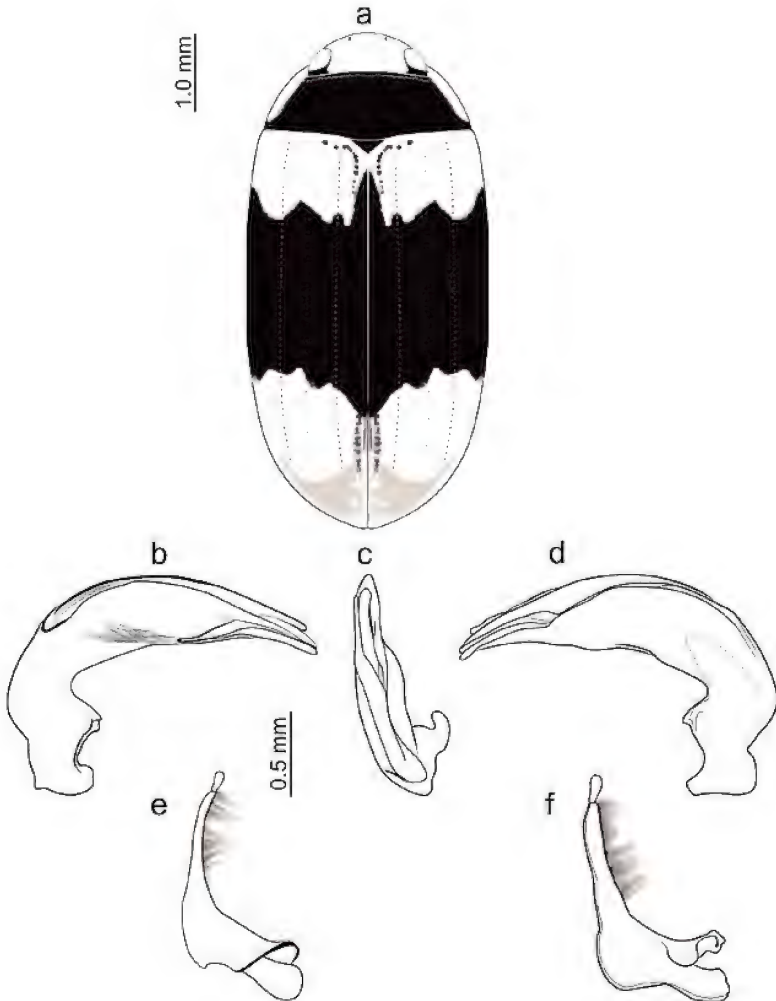


Fig. 2. *Copelatus adelbert* sp. n.: (a) male habitus; (b) median lobe in left lateral view; (c) same in ventral view; (d) same in right view; (e) right paramere in lateral view; (f) left paramere in lateral view.

Structure. Antennae not modified, filiform. Prosternal process without setae, lanceolate and slightly convex, not reaching middle of mesocoxal cavity. Prosternum with setae on either side, long on central part of base and shorter either side. Protibia without ventrobasal emargination (not arcuate). Protarsus with five rows of setae bearing suction palettes (total 24 palettes). Protarsomere V slightly concave ventrally with notch at posterior edge and central band of dense short setae from anterior to posterior edges.

Median lobe of aedeagus broadened in middle part, with apex strongly modified (Figs 2b-d); parameres narrow, with inner margin setose at midlength (Figs 2e-f).

Female. Same as male but with protarsomeres not bearing suction palettes. Female measurements and ratios (minimum-maximum, mean), in mm (n = 2): HL 0.4, 0.4; HW 1.7, 1.7; PL 0.7, 0.7; PW 2.7, 2.7; PW/PL 0.4, 0.4; EL 4.8-5.0, 4.9; EW 3.0, 3.0; TL/EW 2.1, 2.1; TL 5.9-6.1, 6.0.

Distribution. The species is endemic to the Adelbert Mountains in Papua New Guinea (Fig. 3).

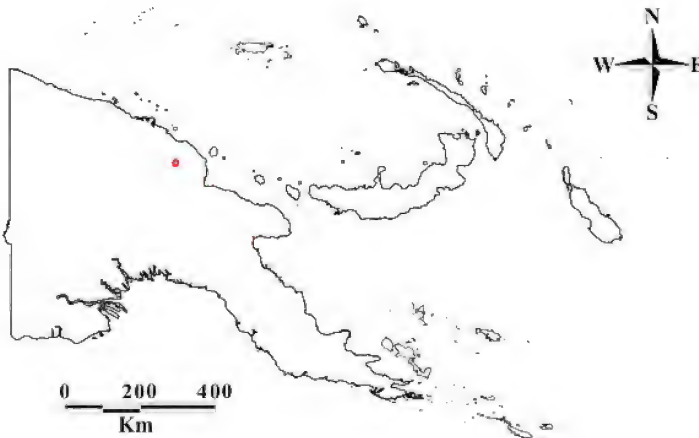


Fig. 3. Distribution of *Copelatus adelbert* sp. n. in Papua New Guinea.

Habitat. Collected from small puddles along forest creeks; the ground was red clay with sand, gravel and sometimes leaves (Fig. 4). Other aquatic beetles present were Hydraenidae, Hydrophilidae and Dytiscidae: genus *Exocelina* Broun.

Etymology. Named after the Adelbert Mountain Range where the species was discovered. The name is a noun in the nominative singular standing in apposition.



Fig. 4. Habitat of *Copelatus adelbert* sp. n., stream setting around Keki Lodge and small puddle at the edge of the streambed which is inhabited by the beetles.

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